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ABSTRACT

This study compared listener response to normal and deafened speakers, and attempted to identify: (1) the basic types of judgments that underlie listeners' responses and those that are likely to be abnormal when the speaker is deafened; and (2) the features of speech responsible for particular reaction types. Subjects were 47 moderately to profoundly postlingually deafened individuals, 19 control speakers, and 660 normal hearing listeners. Recordings of the speakers' reading and less formal speech were evaluated by the listeners. Listeners then responded to a questionnaire that concerned the following: (1) emotional reactions to deafened speakers; (2) assessments of deafened speakers' competence, personality and social relationship, educational and occupational status, and psychological and physical states; and (3) assessments of deafened speakers' speech and language. Results show that listener responses to the profoundly deafened were much stronger than to the hard-of-hearing. The findings suggest that profoundly deafened people face real and extensive social obstacles except in optimal speaking conditions. (MSE)

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SPEECH DISORDER AS A SOCIOLINGUISTIC PROBLEM

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1. Introduction

Sociolinguists have studied a wide variety of speech behaviours which reflect geographical, historical, social and cultural groupings. But they have paid little attention to speech behaviours that fall outside the boundary of normality. The study of abnormal speech, however, is a natural extension of the issue of stigmatised speech that has long been central to sociolinguistics. This paper suggests that sociolinguistics not only has a natural interest in the study of abnormal speech but that it has a necessary role to fill. The application of sociolinguistics to abnormal speech also raises issues which are important for sociolinguistic theory in general.

The paper focuses on a particular variety of abnormal speech - the speech disorder resulting from postlingually acquired deafness. This speech disorder is a good illustration of the role that sociolinguistics can play in the study of disordered speech. Although several studies indicate that postlingually acquired deafness leads to speech deterioration (Penn 1955, Zimmerman and Rettaliata 1981, Abberton et al. 1983, Cowie and Douglas-Cowie 1983, Tye et al. 1983, Plant 1984, Douglas-Cowie et al. 1987), there is a tendency to be dismissive about the problem. For example, a recent clinically oriented study concludes that speech deterioration in acquired deafness is 'not clinically significant' and that speakers do not warrant therapy (Goehl and Kaufman 1984). Several factors contribute to this kind of assessment (see Cowie et al.1986), but one is that deafened speech is often assessed on criteria which are narrowly functional (i.e. can it be understood) or comparative (i.e. compared to prelingual deaf speech it is not a problem) rather than in terms of social acceptability. This is an indefensibly narrow approach to the assessment of speech, since it ignores the social dimension which sociolinguists have shown is fundamental to speech communication. This paper rests on the principle that if deafened speech is, in fact, a socially stigmatised variety, then it is a disorder that deserves serious attention.

Clinicians have made this kind of point in connection with various speech problems, including lateral lisps, stammering, and abnormal voice qualities (Silverman 1976, Turnbaugh et al 1981, Blood et al. 1979). But there have been relatively few studies in the area, and their impact appears to have been limited. It seems likely that this will remain so while studies are isolated from each other and from our general understanding of speech as a social phenomenon.

The present study has its roots in a model due to Douglas-Cowie and Cowie (1984) which suggests how a broader and theoretically deeper analysis of disordered speech might develop. Deafened and control subjects are compared to establish the basic point that listeners respond differentially to the two groups. But the study goes beyond this in two crucial ways.

1. The study attempts to identify the basic types of judgement that underlie listeners' responses, and to establish which types of judgement are particularly likely to be abnormal when the speaker is deafened. The immediate reason for doing this is that one needs to understand the types of adverse reaction that are likely to arise if one is to counter them effectively. In a wider perspective,

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this aspect of the study reflects a central challenge for sociolinguistically oriented work on abnormal speech: that is, to achieve a cohesive account of the different kinds of reaction that may be evoked by different forms of speech, defective as well as normal.

2.The study attempts to identify the features of speech which are responsible for particular types of reaction. This too is a concern which has both immediate practical relevance and theoretical implications which invite wider research. These theoretical implications include, for instance, whether traditional phonetic categories capture the distinctions which are important for understanding reactions to abnormal speech.

2. Method

2.1 Subjects

Two groups of subjects were involved. The first, the speaker sample, provided the stimuli, and consisted of 47 postlingually deafened speakers and 19 control speakers. The second, the listener sample, responded to the stimuli and comprised 660 normal hearing listeners.

All subjects in the speaker sample were from Northern Ireland. Deafened speakers were selected to represent a range of postlingually acquired hearing losses from moderate to profound.They were grouped into two broad categories, referred to as the hard of hearing group and the profoundly deafened group. The cut off point used was an average loss in the better ear of 80dB: this threshold gave a reasonable fit to the intuitive distinction between those who seemed to rely mainly on lipreading for speech reception and those who still heard speech (for comment on this distinction see Cowie and Stewart 1987). The distribution of hearing loss by age at onset of deafness is seen in Table 1. Age at onset is considered here because previous studies suggest that it has an important bearing on deafened speech (Douglas-Cowie et al. 1987).

Level of loss	Age at onset				
	<5	6-15	16-35	36-55	>65
Profoundly deafened	4	9	8	4	0
Hard of hearing	6	4	1	6	1

Table 1: Age at onset and level of loss in the hearing impaired sample.

Two criteria governed the choice of controls. One was direct comparability with deafened speakers. Wherever possible, deafened people's similar aged siblings were recorded. The second criterion was representativeness of the range of accents found in the Belfast area which are known to depend on sex, age, and variables linked to social status (Milroy 1981, Douglas-Cowie 1984).

The listeners were 660 university students from Northern Ireland. They had no specialised knowledge of speech or deafness, and they did not know that the study was concerned with deafness.

2.2 Procedure

Each of the deafened and control speakers was tape recorded in comparable quiet conditions using a high quality tape-recorder. Two types of speech sample were obtained.
(1) Reading. Subjects read five short passages designed to include the range of phonemes in Ulster English and to be easy to read. The passages differed widely in style, ranging from an approximation to everyday chit chat to a more literary narrative style.
(2) Less formal speech. Subjects were asked to describe what was happening in each of three cartoon strips taken, for simplicity, from a child's book. This approach gave passages that were comparable in subject matter and tone, but reasonably informal in style.
Each listener heard a tape recording of all of the passages from one speaker, and shadowed them to provide a measure of intelligibility (reported in Douglas-Cowie et al. 1987). Ten listeners heard each speaker. After the shadowing task subjects were asked to fill in a questionnaire on their reactions to and assessments of the speaker they had just heard.

The questionnaire consisted of 67 items. Responses were made on a five point scale ranging from "definitely agree" to "definitely disagree". The questionnaire was developed using previous sources concerned with reactions to deaf and deafened people's speech (Davison 1979, Nicholl 1981, Cowie and Douglas-Cowie 1983), stereotypes of deaf and deafened people (e.g. Bunting 1981), and general sociolinguistic work on reactions to speech (e.g. Giles and Powesland 1975, Scherer and Giles 1979). The items can be summarised under three main headings.
(1) Listeners' emotional reactions to deafened speakers. Particular questionnaire items here probed, for example, reactions of embarrassment, pity, frustration, sympathy, confusion.
(2) Listeners' assessments of deafened speakers. These involve assessments of their competence, their personality and social relationships, their educational and occupational status, and their psychological and physical states (e.g. depressed, anxious, mentally deficient, stroke victim, spastic).
(3) Listeners' assessments of their speech and language.
Seven questionnaire items dealt with aspects of speech. They asked whether the speech seemed generally normal, and whether it suffered from any of the following defects: difficult to understand; bad (slurred) articulation; strange quality of sound; monotony; bad control of pitch; bad control of volume. These items were intended to capture the major problems which the literature suggests might occur in deafened speech, but to express them in a way that would make sense to listeners with no knowledge of phonetics.
Five items related to speakers' ability to express themselves. They dealt with vocabulary, grammar, description, organisation of ideas, and imaginativeness. Differences on these dimensions would be expected to affect speakers' ratings, and so it is important to take them into consideration: but it would be surprising if these abilities were systematically affected by postlingual deafness.

3. Results.

The questionnaire data will be considered under three main headings, each relating to a different set of issues. All of the analyses used scores averaged across listeners (i.e. each speaker was assigned one score per questionnaire item). The most favourable possible response was always assigned a score of 5, and the least favourable a score of 1.

3.1. Ratings of deafened speech *per se* .

It is useful to begin by considering listeners' responses to questions about speech per se. This gives the reader some impression of the speech whose effects are under consideration, and also makes a number of points which are of particular interest to linguists.

Speech was judged on seven dimensions. For each of these, three t tests were carried out - one comparing the controls and the profoundly deafened group, one comparing the controls and the hard of hearing group, and one comparing the profoundly deafened group and the hard of hearing. These comparisons are summarised in Table 2.

ITEM	MEAN SCORES (3=neutral, 1=definitely has defect)			T TESTS		
	C (controls)	H (hard of hearing)	P (profound)	P vs C	H vs C	P vs H
Normal speech	2.9	2.4	1.9	***	**	**
Hard to understand	2.9	2.1	1.6	***	***	**
Slurred articulation	3.3	2.4	1.9	***	***	*
Strange sound quality	3.1	2.5	2.2	***	***	*
Monotonous	2.6	2.5	2.1	**	-	*
Bad control of pitch	3.1	2.8	2.5	**	-	*
Bad control of volume	3.1	2.9	3.0	-	-	-

Table 2: assessments of speech. The outcomes of t tests (one tailed) are represented as follows: *** means $p<0.001$; ** means $0.01>p>0.001$; * means $0.05>p>0.01$.

Three main points emerge from these findings.

1. Listeners judge deafened speech more negatively than normal speech. This applies to both hearing impaired groups, the hard of hearing and the profoundly deafened.

2.The extent of the loss affects the amount of deterioration which occurs. The profoundly deafened group receive significantly worse ratings than the hard of hearing on six of the seven items; and there are two items where the profoundly deafened differ significantly from the controls, but the hard of hearing do not.

3. Listeners find deafened speech noticeably abnormal in some respects, less so or not at all in others. Table 2 shows that deafened speakers' control of volume is not rated worse than controls', and that the differences involving control of pitch and monotony are less marked than those which involve quality, articulation, intelligibility and overall normality.

This evidence reinforces the point made by some studies which use trained observers (Penn 1955, Cowie and Douglas-Cowie 1983) - though not all (see Goehl and Kaufman 1984) - that postlingually acquired deafness can lead to speech deterioration. But it also makes two distinctive contributions. The first is to show that the changes produced by acquired deafness are apparent to ordinary listeners, not just to the trained ear. The second is to identify the aspects of deafened speech which are most salient to ordinary listeners. It is noticeable that these are not the aspects which have received most attention in the literature, and this raises questions about the relationship between phonetic and sociolinguistic work. Most of the literature on acquired deafness discusses characteristics which are easy to specify phonetically, but which this evidence suggests are not of prime importance for speakers' reception. Conversely, the characteristics which strike naive observers are not easily linked to formal phonetic concepts. This suggests that there is room for a joint sociolinguistic and phonetic approach to abnormal speech, aimed at providing phonetic categories which lend themselves to expressing socially important distinctions.

3.2. The dimensions underlying listeners' reactions and their relation to specific aspects of speech.

3.2.1 Rationale and concepts underlying the analysis.

Intuitively it seems most unlikely that the responses given by each subject reflect sixty-odd independent types of reaction, each quite separate from the other reactions that the questionnaire probed and from any other reaction that it might have probed (but happened not to). It seems much more likely that subjects' sixty-odd overt responses flowed from a smaller number of underlying types of reaction, each of which had some bearing on several of the overt responses which were studied, and would have a bearing on various other responses that were not studied. This kind of model is familiar from work which argues that accents related to social class cause speakers to be evaluated on dimensions such as prestige, trustworthiness, androgyny, etc. (e.g. Elyan et al.1978). One would expect to find familiar dimensions appearing in work with abnormal speech, but one would also expect new ones to become apparent. These would involve reactions which vary very little so long as speech is normal, and which only change noticeably as speech moves beyond the bounds of normality.

Factor analysis was used to derive a set of underlying reactions which would explain the questionnaire data. Roughly speaking, factor analysis organises items into clusters in such a way that (a) speakers who score relatively well on one item in the cluster are likely to score relatively well on the others, and (b) there is little or no relationship between a speaker's score on an item in one cluster and his score on items in any other cluster. The items which form a cluster are linked by a hypothetical 'factor': the analysis assigns each speaker a score on each factor in such a way that subjects' scores on a factor tend to correlate highly with their scores on each item in the associated cluster. The correlation between speakers' scores on a given factor and their scores on a questionnaire item is called the loading of the item on the factor.

In this study, each factor should (ideally) correspond to one of the basic ways in which listeners react to speakers. High loadings can have two kinds of interpretation, depending on the items involved. If two items involve a judgement about the speaker, and both have a high loading on the same factor, this suggests that both ratings are strongly influenced by a single underlying type of reaction (which corresponds to the factor). But if an item concerned with speech loads highly on the same factor, the natural inference is that that feature of speech contributes to producing the reaction.

3.2.2 The dimensions of listeners' reactions.

The factor analysis used Varimax extraction followed by an Orthotran oblique transformation. Ten questionnaire items were excluded in order to ensure sampling adequacy. The analysis yielded eleven factors, but four of these accounted (directly) for less than four per cent of the variance, and can be ignored.

The seven remaining factors are summarised in Table 3. The items associated with a factor are those whose loading on it is greater than 0.45. (This cut off associates most items with one and only one factor.) The factor summaries are based on these items (and occasionally others with slightly lower loadings which appear to clarify matters).

Summary description of factor	Characteristics attributed to high scorers:	
	speech & language	**social & personal**
Competence	good vocabulary, grammar, description, & organisation of ideas	organised, intelligent, likely to reach high levels in education (4 items) and employment (4 items).
Warmth	not monotonous	friendly, cheerful, cooperative, able to handle close friendships, not depressed.
Social poise	-	self confident, amusing; not timid, withdrawn, or anxious.
Stability	-	reliable, sensible, able to handle close friendships and working relationships.
Disability	poor articulation, strange quality, hard to understand, not normal.	would evoke sympathy; might be deaf, mentally deficient, spastic, autistic, or a stroke victim.
Subnormality	poor control of volume and pitch	might not have achieved normal primary education
Social threat	-	listener anticipates that meeting speaker might cause embarrassment or shock , would be apprehensive about it.

Table 3: Factors extracted from the questionnaire data.

The next section uses these factors to examine how reactions to deafened speakers differ from reactions to the controls. However the factor pattern itself makes two significant points.

1. The factor analysis confirms that there are socially significant forms of reaction to speech which are easily overlooked if one studies only normal speakers. Table 3 is laid out to emphasise this point. The first four factors involve reactions which are familiar from work on the sociolinguistics of normal speech. The last three factors have no obvious analogues in the sociolinguistic literature: they would not be expected to, since most normal speakers presumably cluster near the bottom end of all these dimensions. But the fact that the factors emerge in this study indicates that in a wider sample, people do evoke substantially and consistently different reactions on these dimensions.

A clear conclusion is that research on the social significance of abnormal speech should not confine itself to exploring dimensions that are familiar from the sociolinguistics of normal speech. But these dimensions are relevant to sociolinguistics as a whole, not just to research on abnormal speech. It is an important point about normal speech that for all its variability, it maintains these reactions within a very narrow range. Many people speak so as to seem socially disadvantaged, but very few speak so as to seem disabled. This needs explanation. The need for explanation is nicely illustrated by the fact that acquired deafness can lead people to stray outside the bounds of normality. What acquired deafness removes is the ability to monitor one's speech. The fact that losing that ability leads people to sound abnormal indicates that staying within the bounds of normality is not a trivial achievement: it depends on continuous, active monitoring.

2. Four factors have substantial loadings on speech or language items. It is striking that speech and

language items do associate with reactions in a clear cut and intuitively reasonable way. This suggests that it is possible to pinpoint the speech characteristics which produce particular kinds of reaction, and provides a preliminary picture of some links. This kind of information could clearly be used to direct therapy. However the present data have to be treated with care.

The general problem is that subjects' descriptions do not translate simply into objective phonetic categories. For instance the term 'monotony' as applied to deafened speech may refer to lack of pitch movement or to excessive use of a particular pattern of pitch movement (Cowie et al.1988b). Also the fact that because a factor lacks speech-related elements does not mean that it has no phonetic basis: it simply means that none of the terms on offer captured the relevant dimensions of speech.

This problem is compounded by the fact that listeners' impressions of a speaker may influence their descriptions of his speech and language. The linguistic abilities associated with the first factor provide a revealing example. Listeners had little direct evidence of speakers' linguistic skills: most of what they heard consisted of reading passages, whose vocabulary, grammar, and expression were due to the writer, not the reader, and were the same for all readers. This suggests that listeners may have assessed linguistic competence not on the basis of the linguistic performance they heard, but rather on the basis of speech variables which created a general impression of the speaker's competence.To anticipate, this view is reinforced by evidence that deafened speakers' ratings on this factor were worse than the controls: there is no reason to believe that acquired deafness impairs people's linguistic abilities.

These difficulties mean that the present evidence needs to be supplemented with research which looks directly at objective correlates of listeners' judgements. Research of this kind is currently in progress, looking at potentially relevant acoustic features (Cowie et al 1988a), features of intonation (Cowie et al. 1988b), and the language used by speakers in the informal passages (Beagon, in preparation).

3.3 The effect of hearing loss on listeners' assessment of speakers

There is a strong overall relationship between hearing level and speaker assessment. This is indicated by two way analyses of variance which take account of all the questionnaire items. These show that overall the profoundly deafened group fared worse on listeners assessments than the hard of hearing ($F\ 1,45 = 6.54$, $p=0.014$) and that the hard of hearing fared worse than the controls ($F\ 1,39 = 9.643$, $p=0.0035$). But each comparison between groups is associated with a significant interaction ($p< 0.0001$) between hearing and item, indicating that the effect of hearing impairment differs from item to item. The results of the factor analysis provide a way of breaking down the data which takes these variations into account.

Two types of test were used - analysis of variance and regression analysis. Each makes a particular contribution. Regressions can handle several continuous variables simultaneously, and show how they affect scores related to a given factor. Analysis of variance is able to examine differences between the major categories of subjects (profoundly deaf, hard of hearing and controls), and also to test for differences among the items associated with a single factor.

Regression was used to examine links between the factors and objective variables of two types: audiological variables, and socio-demographic variables which are known to bear on

speech. The analyses reported here use five such variables: socio-economic status; sex; age at time of testing; average pure tone threshold in the better ear; and age at onset of deafness for the profoundly deafened (both other groups had scores of zero on this variable). These were chosen after exploratory work with a wider range of variables: none of the others contributed significantly to predicting any of the dependent variables which were considered.

Two sets of regressions were carried out. In the first set, the dependent variables were the factor scores which (theoretically) give pure estimates of the underlying reactions associated with each factor. The second set used what will be called factor item scores. For any given factor, a subject's factor item score was the average of his scores on the various items associated with that factor in Table 3. Table 4 summarises the results.

	PURE FACTOR SCORES					FACTOR ITEM SCORES				
	status	age	sex	loss	onset	status	age	sex	loss	onset
Competence	.0007	.003				.0004	.002		.002	
Warmth			.09					.009	.06	
Social poise									.01	
Stability			.09					.003	.04	
Disability				.0001	.01			.08	.0001	.02
Subnormality									.01	
Social threat						.04			.004	

Table 4: Regression analyses on factor scores and factor item scores. Each entry shows the probability that a variable's correlation with a factor score is due to chance. A blank indicates that the probability is greater than 0.1.

The regressions on pure factor scores show a striking pattern. Only the disability factor is linked to hearing loss. Three of the other factors are linked to standard socio-demographic variables (youth and high status favour impressions of competence, females are perceived as warmer and more stable), and the rest are unrelated to any of the variables considered here.

The strong interpretation of this pattern is that one and only one underlying reaction is affected by the audible results of acquired deafness. This is an intriguing conjecture, and it may be true. However it is important to acknowledge that it may also be an artefact. This is because factor analysis is designed to ensure that scores on one factor correlate weakly or not at all with scores on any other. It follows from this property that a variable is unlikely to correlate significantly with more than one factor. The neat relationship between hearing loss and the disability factor may simply reflects these properties of the analysis, or it may have a deep psychological reality: there is no way of deciding without additional evidence.

The regressions on the right of Table 4 use factor item scores. These are only indirectly related to the hypothetical reactions measured by pure factor scores. Factor analysis assumes that a subject's response to any individual item is shaped by several underlying reactions: hence a factor item score, which is a simple average of responses to several items, will generally reflect several underlying reactions too. But conversely, factor item scores are directly related to the way subjects answer particular groups of questions, whereas pure factor scores are not. This means, for instance, that no mathematical subtleties prevent the same variable from correlating with several factor item scores.

The regressions on factor item scores show that hearing loss does in fact relate to all the groups of responses. It may be that only one underlying reaction is affected by the audible results of acquired deafness, but if so, that reaction exerts a significant influence on most kinds of response that listeners make. Also of interest are the relationships between audiological and socio-demographic variables. Regression analyses were carried out partly to check whether differences between groups were actually due to socio-demographic variables rather than hearing loss.The regressions on factor item scores make it clear that loss is related to listener reactions even when socio-demographic variables are taken into account. A subtler point is that five of the seven types of reaction are influenced by both socio-demographic and audiological variables. This suggests that the two types of variable have related influences on speech: they cannot be kept apart in separate theoretical domains.

In addition to the regressions, three two way analyses of variance were carried out on each set of items associated with a major factor. The controls were compared to each hearing impaired group, and the two hearing impaired groups to each other. Three main points emerged.

1. Hearing x item interactions were examined in order to check whether the items associated with each factor behaved relatively homogeneously (in the sense that differences between groups of speakers were relatively constant across items). With one minor exception, they indicate that the sets of items derived from factor analysis were reasonably coherent. None of the profoundly deafened/ hard of hearing comparisons produced a significant interaction between hearing level and item.Three sets of items showed no significant interaction in either hearing impaired/ control comparison - the sets associated with poise, subnormality, and social threat. In the other four sets, both interactions were significant or very nearly so. But only in one case did the interaction appear to mean that one item was behaving differently from the others in the group: the item 'able to handle close friendships', which (uniquely) appears in two factors, showed a markedly different pattern from the other items associated with either factor.

2. The profoundly deafened were rated significantly worse than the controls on every set of items, and significantly worse than the hard of hearing on every set of items but the one concerned with competence.

3. The hard of hearing differed significantly from the controls on only two sets of items, those concerned with competence and those concerned with disability. The pattern of interactions (see 1 above) gave no grounds for thinking that they fared worse than controls on some individual items in other groups.

4. Discussion.

The work described here can be considered on two levels: for what it indicates about deafened people, and for what it offers sociolinguists.

The simplest point about deafened people is that their hearing loss does have an appreciable effect on their speech. So far as the profoundly deafened are concerned, this adds to a balance of evidence which already pointed in this direction. But no previous paper has given clear evidence that groups like the hard of hearing in this study have noticeably abnormal speech.

The use of factor analysis makes it possible to separate out the kinds of reaction that deafened speakers are likely to face, and the aspects of speech which give rise to them.

The central reaction appears to be the one associated with the factor described as 'disability'. Listeners registered that something was organically wrong with speakers from both deafened groups. They did not know what: they recognised that it could have been deafness, but they also felt that the problem could have been a disorder of the brain, or of motor control. The characteristics of speech which suggested this appear to relate to rapid changes - in the vocal folds or the articulators - rather than to slower changing quantities such as pitch or volume.

The simplest reading of the factor analysis (based on the pure factor scores) is that this is the only basic reaction which depended on speakers' hearing. It is impossible to evalute this conjecture without additional evidence, though one line of reasoning gives some grounds to question it. This hinges on the fact that some other factors involve speech related items. Monotony appears to suggest that speakers lack emotional warmth, which is consistent with the findings of Frick (1985) and others that intonation is used to assess speakers' emotions: and poor control of pitch and volume appear to suggest a lack of basic education. The profoundly deafened were described as markedly more monotonous than the hard of hearing or the controls, and somewhat worse at controlling pitch, and this tends to suggest that listeners may form an underlying impression that they lack warmth and basic culture.

Be this as it may, it is clear from the factor item scores that the profoundly deafened fared worse than the controls on every substantial group of responses. It may be that hearing-related speech abnormalities evoke only one basic type of reaction in listeners; but if so, that reaction affects a wide range of outward responses.

The hard of hearing present a different picture. The only aspects of their speech which differed significantly from the controls' were those which related to the disability factor. Correspondingly they fared worse than the controls on the items related to disability. They also differed from controls on one other set of items - those which related to speakers' competence. Somewhat surprisingly, they were rated no better than the profoundly deafened on the 'competence' items. This may well be explained by the fact that both status and age affect judgements of competence (as the regression analysis shows): the hard of hearing were generally older, and of lower status, than the profoundly deafened group.

These findings point towards the conclusion that profoundly deafened people face real and extensive social obstacles because of their speech. But the argument is incomplete without information about how the findings transfer to a real situation, where listeners have information from a speaker's visible behaviour and the content of what he says as well as from his speech per se. Preliminary work argues against over-optimism about the effects of face to face encounters (Cowie et al. in press). Given optimal conditions, a deafened speaker who is good at self presentation can create as good an impression as a normal hearing control. But the forms of self presentation which have this effect seem to be quite specific, and some behaviours which create a good impression in their own right appear to malinteract badly with speech problems - presumably because listeners are unsettled by hearing impressive content presented in defective speech. Hearing impaired people also tend to exhibit non speech behaviours which create a bad impression, such as looking puzzled, using abnormal eye contact (as they must to lipread), and responding inappropriately or not at all to what an interlocutor says. Overall, it seems unlikely that other behaviours generally do much to mitigate the effects of deafened people's speech problems.

An appropriate response to this problem needs to draw on the various kinds of knowledge that have been considered in this paper. It is mainly the profoundly deafened who seem to need

therapy: the hard of hearing have much more limited problems. Speech therapy as such should be directed towards the speech problems which are apparent to ordinary listeners, and more specifically towards problems which have a serious effect on their attitudes towards deafened speakers. This means giving priority to the problems which listeners described in terms of poor intelligibilty and abnormal quality and articulation: the fact that they are difficult to pin down phonetically should be an impetus to phonetic research, not an excuse for focusing on more tractable aspects of speech. If the practically important speech defects cannot be treated, then therapy needs to focus on ways of countering their effects. This approach is most likely to succeed if it rests on a clear understanding of the basic effects that the speech problems produce. For instance, the factor analysis reported here suggests that deafened speakers have little to gain from measures designed to boost their apparent status, since these will not counter the basic negative impression that their speech creates. This point is reinforced by the finding of Cowie et al. (in press) that there is no simple relationship between the way listeners react to self accounts spoken by hearing impaired speakers and the way they react to the content of the accounts in isolation from the speech.

For sociolinguists, the paper has attempted to identify a territory which is ripe for settlement, and some of the themes and techniques which are relevant to it. The study which is described in detail here depends on techniques - highly controlled presentation, response elicitation by questionnaire, and factor analysis - which have been widely and rightly criticised. But balanced criticism (e.g. Gould, 1981) focuses on the problems which arise when they are used in isolation and without an understanding of their limitations. This is why care has been taken to stress that they can be linked to other sources of information, and interpreted in keeping with intuitively reasonable assumptions. Handled in this way, they are powerful tools. More generally, the paper has attempted to show that disentangling listeners' responses to disordered speech is a large and intellectually challenging problem, with practical applications on the one hand, and the potential to open new perspectives on the study of normal speech on the other.

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